PROMISE®
TECHNOLOGY, INC.

PROMISE ARRAY MANAGEMENT (PAM) FOR FastTrak S150 TX2plus, S150 TX4 and TX4000 User Manual

Version 1.3

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Chapter 1: Introduction

Promise Array Management (PAM) is a utility application designed specifically for monitoring and managing Promise Technology RAID products, such as the FastTrak TX4000, S150 TX2 plus and TX4 RAID Controller cards. Promise includes BIOS-based RAID management utilities with each of its products. PAM, however, runs over a local area network and makes possible RAID monitoring and management from any computer on the network and even over Internet. This allows your IT manager to watch your RAIDs and take care of them over the network.

PAM Components

There are three components to PAM. Depending on your installation, all three may be on the same workstation or work separately across your network:

Monitoring Utility — The Monitoring Utility is a Graphic User Interface (GUI) that reports on the condition of the RAID array. It receives and displays reports on RAID condition and operation through the Message Server. The Monitoring Utility works on any PC with a TCP/IP network connection to your RAID.

When installed on the computer that operates the RAID, the Monitoring Utility also provides a complete set of RAID management tools.

Message Server — The Message Server is the link connecting a PC with the Monitoring Utility. Normally, the Message Server runs on a network file server. But it can also run on the PC controlling the RAID.

Message Agent — The Message Agent runs on the PC that controls the RAID, called the “RAID PC”. It directly monitors the RAID and sends messages through the Message Server to all PCs running the Monitoring Utility.

How They Work Together

The Promise Array Management (PAM) utility provides and easy way to set up, monitor, modify and repair your RAID. PAM works with the Promise FastTrak TX4000, S150 TX2plus and TX4 RAID Controller cards.

PAM watches the RAID and when significant events happen, or it discovers a problem, the Message Agent sends a warning to the Message Server. The Message Server passes the warning along to all PCs running the Monitoring Utility.

Warnings appear on the PC in the form of email messages and popup alerts. You can select either one or both. You can also select which events and problems PAM will report.

A major benefit of PAM is that it runs over a TCP/IP network. This enables remote monitoring of your RAIDs, including offsite monitoring over an Internet connection.

Once you become aware of a problem, go to the PC that controls the RAID, called the “RAID PC” to take corrective action. If you have more than one RAID PC on your network, PAM will indicate which one has the problem.

PAM allows only monitoring access through the network. Management access occurs only at the RAID PC.

PAM Installation Options

1. Following are some examples of ways you can incorporate PAM into your network and RAID systems.

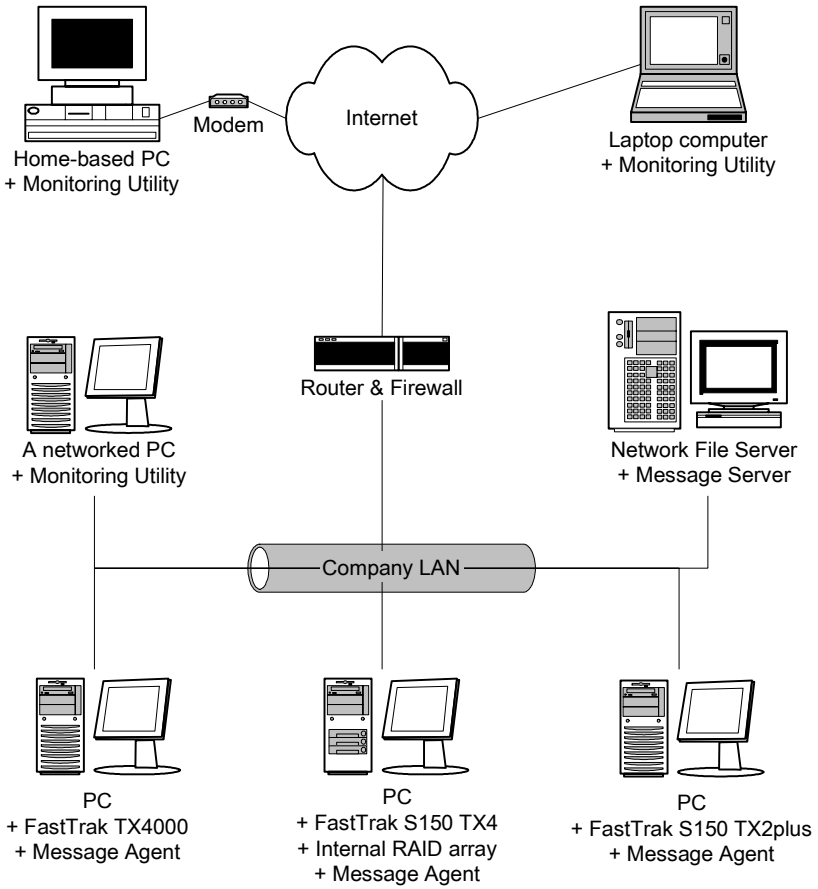


Figure 1. **LAN and Internet connections.**

In the example on the facing page, there are three PCs with FastTrak cards connected to the company's LAN. The PAM Message Agent runs on each of the PCs with a FastTrak card. The PAM Message Server runs on the company's file server. The PAM Monitoring Utility runs on networked PCs and also on remote PCs connecting to the company network through the Internet. With this arrangement, you can monitor RAID condition and activity from offsite, such as a hotel room or home office.

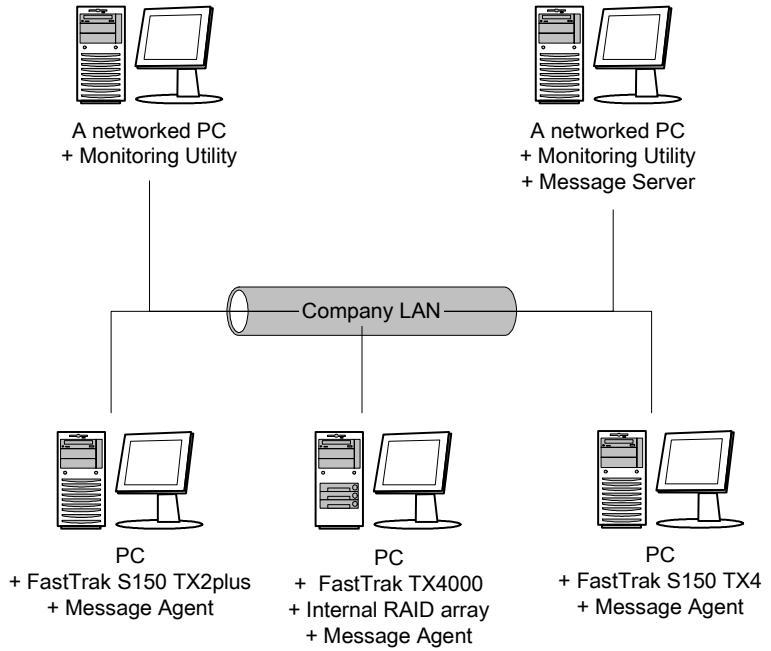
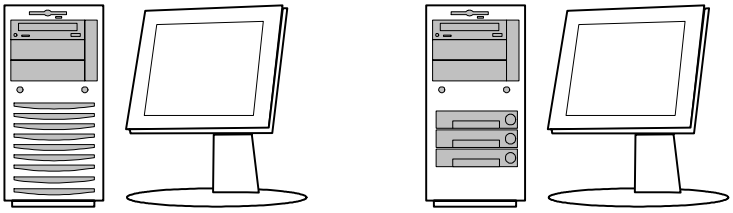


Figure 2. **Company LAN without a File Server**

In the above example, there are three PCs with FastTrak cards connected to the company's LAN, the same as before. But this network has no file server, so the PAM Message Server runs on one of the networked PCs. PAM Monitoring Utility runs on both networked PCs. If this LAN were upgraded with a suitable router and an Internet connection, you could set up offsite monitoring as in Figure 1.



PC
+ FastTrak TX4000
+ Monitoring Utility
+ Message Agent

PC
+ FastTrak S150 TX4
+ Internal RAID array
+ Monitoring Utility
+ Message Agent

Figure 3. **PCs with Internal RAID.**

Promise's FastTrak card is designed to setup and control a RAID within the PC's enclosure. They have the same need of monitoring and management as an external RAID subsystem. All three PAM components run on the PC itself.

Important

This manual accompanies a special version of PAM optimized to run with the FastTrak TX4000, FastTrak S150 TX2plus, and FastTrak S150 TX4.

Other versions of PAM will run reliably on the Promise RAID product with which they ship. They will also run reliably on several Promise RAID products in normal use. However, they may not perform adequately with a FastTrak TX4000, FastTrak S150 TX2plus, or FastTrak S150 TX4.

Chapter 2: Installation

To install Promise Array Management (PAM) is an uncomplicated procedure, once you understand your systems and how you want to use PAM. The purpose of this Chapter is to help you plan and carry out your installation of PAM.

By way of review, PAM consists of three components:

- Monitoring Utility
- Message Server
- Message Agent

These were described in the previous chapter. Before proceeding with the installation, you must know which component goes where. If you plan to run PAM over a network, you must know the IP addresses of each computer on the network that will be involved in your RAID monitoring and management activity.

Installation Locations

In the table below are possible locations for each of the three PAM components.

	Monitoring Utility	Message Server	Message Agent
Internet-connected PC	•		
Network PC	•	•	
Network File Server	•	•	
RAID PC	•	•	•

Table 1. **Acceptable PAM Component Installation Locations.**

Monitoring Utility

The Monitoring Utility installs on any computer you will use to monitor and manage the RAIDs.

If your RAID runs without a network connection, install it on the RAID PC with the rest of the PAM components.

If your RAIDs are networked, you can install the Monitoring Utility on any computer connected to the network.

If your company has networked RAIDs and Internet access, you may choose to install the Monitoring Utility on a laptop or home-based PC for dial-in remote access.

Limit your installation to the computers of RAID users and your IT administrator. PAM features password protection to further limit access and provide security of your data.

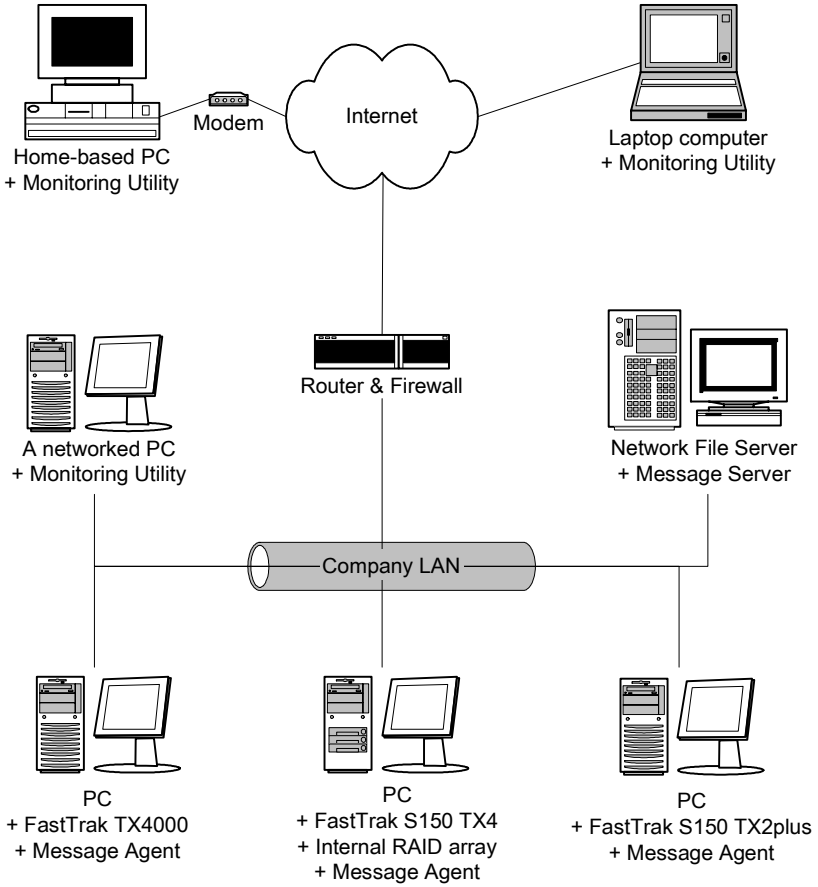


Figure 4. **Networked RAID has many installation options.**

Message Server

The Message Server is required if your RAID PC connects to a network.

If you want run PAM over a network, install the Message Server on one of your networked computers including a file server, a networked PC or the RAID PC.

Only one installation of the Message Server is required for PAM to work over a network. You may install Message Server on more than one network PC or file server, but PAM's network configuration will only use one of them, thus any additional installations are useless.

Do not install the Message Server on any PC that may be disconnected from the network, such as a laptop or a computer that connects via the Internet. Not only will a disconnect cause PAM to fail, but reconnecting again may involve time-consuming network configuration.

Network configuration is discussed later in this chapter.

Message Agent

The Message Agent installs on the RAID PC, whether your RAID is networked or not. In order for PAM to monitor and manage a RAID, it must have Message Agent installed.

If you have more than one PAM-compatible RAID PC on your network, you may install a copy of Message Agent on all of them.

Operating System Support

PAM is a utility designed to run on top of previously installed Promise FastTrak card. Generally, if your PC runs the FastTrak card properly, it will run PAM also.

Promise Technology recommends Windows NT 4.0, 2000, XP Professional or Server 2003 to take full advantage of all the features of PAM. In some cases, you can run PAM on other Windows operating systems. This becomes an issue when running PAM over a network where there are PCs with different operating systems.

Network Requirements

If you plan to install PAM on a network be sure all the hosts and servers are connected and running. That is, each of the PCs, RAIDs and Servers must have a working network connection before you install PAM.

In order for PAM to be configured over a network, you must know the IP (network) address of the RAID PC(s) in your system. The Message Server uses IP addresses to communicate with the Message Agent on the RAID PCs and the Monitoring Utility on the network PCs.

See *Appendix C: Networking Issues* for help in finding the IP Address of the RAID PC.

Installation Procedure

Before you start…

If you are installing PAM to run over a network, determine the computers and servers onto which you will install PAM. Obtain the IP addresses of all RAID PCs where PAM will be installed.

PAM Installation

With that information ready, follow these steps to install PAM on each computer or server:

1. Boot the PC/server and launch Windows.
2. If the computer is already running, exit all programs.
3. Insert FastTrak CD into your CD-ROM drive.
4. Open the CD and locate the PAM folder.
5. Inside the PAM folder, look for the PAM Installer icon (right).
6. Double-click the icon to run the installer. The opening screen appears.

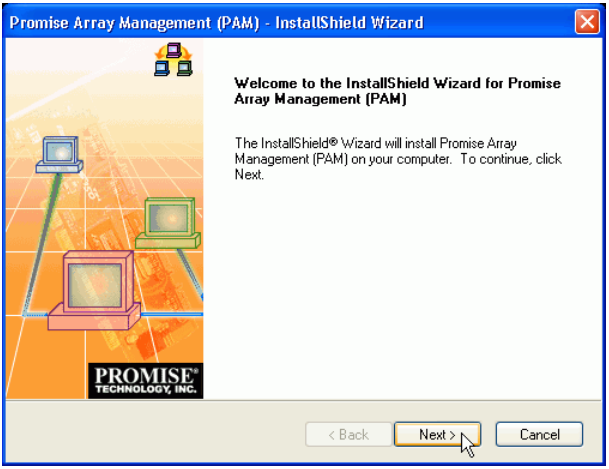


Figure 5. **PAM Setup Opening Screen.**

7. Click Next or press Enter to continue.

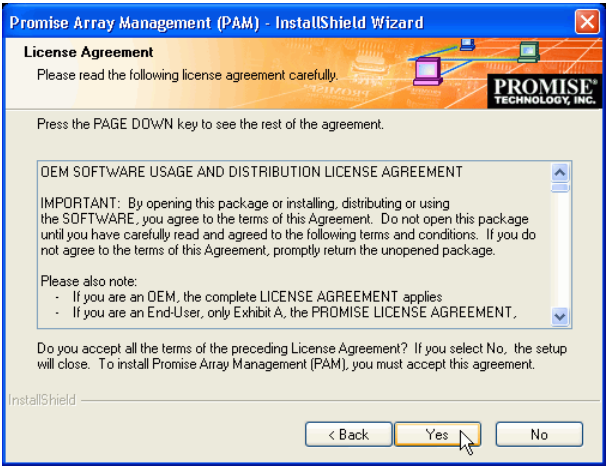


Figure 6. **The License Agreement.**

8. When the License Agreement appears, click the Yes button to agree to the terms and continue the installation.

   If you click No, PAM Setup will exit.

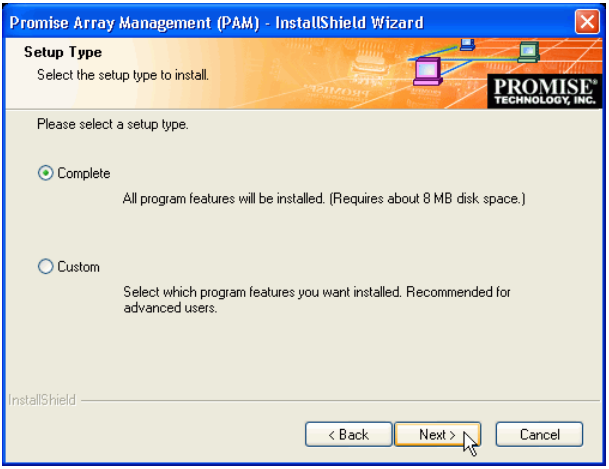


Figure 7. **The Setup Type dialog box.**

9. In the Setup Type dialog box, make your choice between Complete (Recommended) and Custom installation. Use the Custom installation to change install locations or to deselect individual components.
10. Click Next or press Enter to continue.

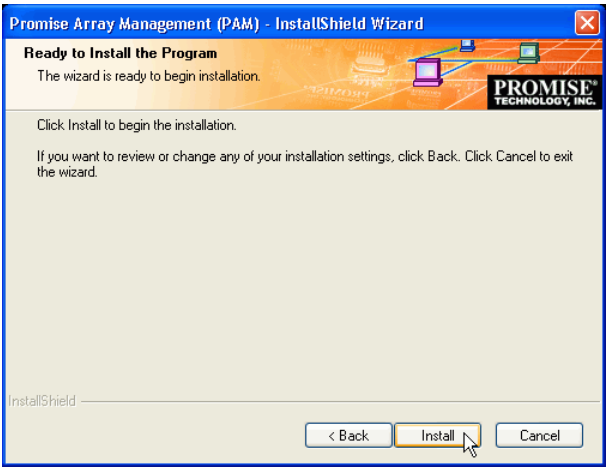


Figure 8. **Ready to Install dialog box.**

11. In the Ready to Install dialog box, click Install or press Enter to continue.

Figure 9. **Add User Account dialog box.**

12. When the Add User Account dialog box appears, you may accept the default name or enter a new one in the Name field.
13. Enter your password in the Password and Confirm Password fields. When you are done, click Next or press Enter to continue.

Note

If you are only installing the Message Server, this dialog box does not appear.

Figure 10. **Installation Complete.**

14. When the Install Complete dialog box appears, you have the option to
    - Create PAM shortcuts on your Desktop
    - Register PAM online

    Both of these options are recommended.
15. Click Finish or press Enter when you are done.

This completes the PAM installation. Go on to *Chapter 3: Initial Setup*.

Chapter 3: Initial Setup

After you have completed installation, you must setup your PAM Monitoring Utility to work with your RAID.

Launch PAM

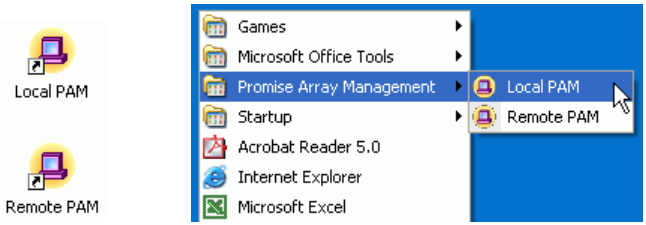


Figure 11. **PAM on the Desktop and in the Start Menu.**

To Start PAM, click on a Desktop icon or go to Start > Programs > Promise Array Management and select:

Local PAM – Use to monitor and manage the FastTrak Controller in your PC

Remote PAM – Use to monitor FastTrak Controllers over your network

Note

If you only installed the Message Server, this shortcut does not appear. The Message Server works only through network connections and has no user interface. Go to the RAID PC or a Networked PC to setup PAM.

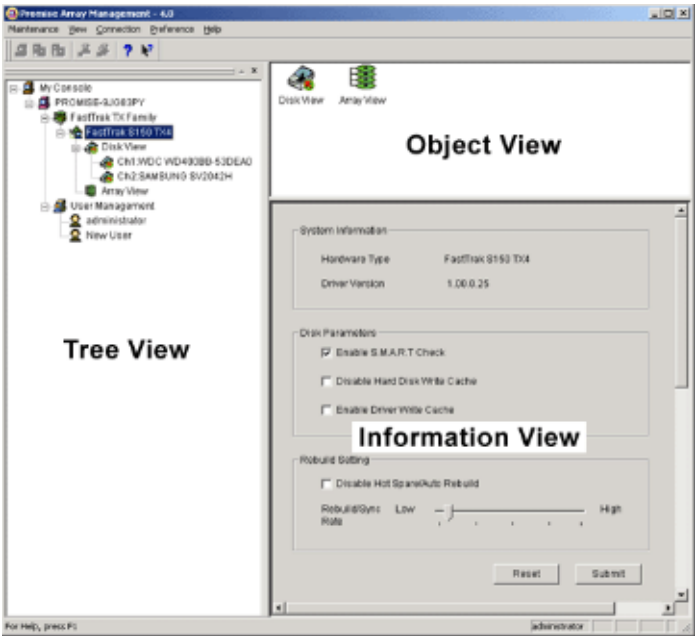


Figure 12. **The PAM Monitor window.**

The Monitor window is the user interface for PAM. It has three views:

Tree View — Displays the elements of your RAID system. It works like Windows Explorer with hierarchical menus. You can expand individual items to see their components.

Object View — Displays icons representing the devices below the highlighted device in the Tree View.

Information View — Displays information on the item highlighted in the Tree View. This may include text boxes, list boxes, fields and buttons. It varies with

Local Agent Log-in

Launch Local PAM. When the PAM user interface appears:

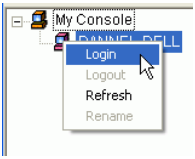


Figure 13. **Log in to Local PAM.**

1. Right click on the RAID Machine icon in Tree View. Select Login from the popup menu. The Login dialog box appears.

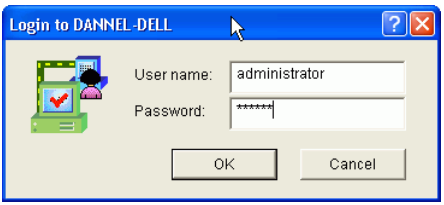


Figure 14. **Login dialog box.**

2. In the Login dialog box, type your Username and Password, and click OK.

   Initially, administrator is the only user. Use the administrator's password selected during installation.

Remote PAM Log-in

Remote PAM works over your network. Therefore it requires additional steps the first time you log on. Launch Remote PAM. When the PAM user interface appears:

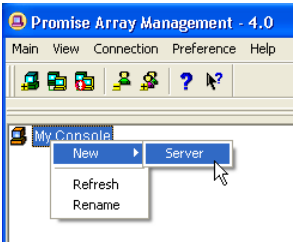


Figure 15. **Make a new RAID Server.**

1. Right-click on the My Console icon and:
   - Select New > Server from the popup menu.
   - Click the New Server icon in the Toolbar.

   A RAID Server icon appears.

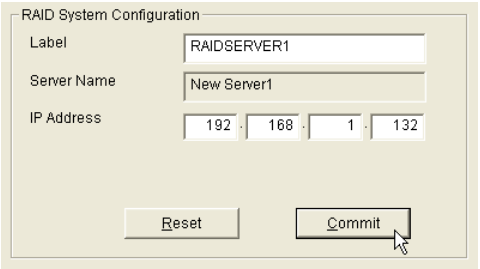


Figure 16. **RAID System Configuration box.**

2. Click on the RAID Server icon. In Information View, type in the IP address of the computer where the Message Server Software is installed.

   If the Message Server software in installed on the monitoring PC (the PC you are now working on), you can use the default 127.0.0.1 IP address.

3. Click Commit. A list of networked RAID PCs appears as shown below.

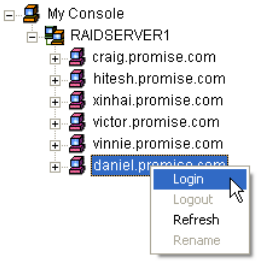


Figure 17. **List of networked RAID PCs.**

4. Right-click on the RAID Machine icon in Tree View. Select Login from the popup menu. The Login dialog box appears.

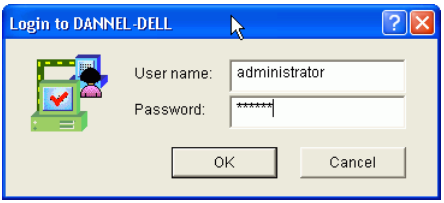


Figure 18. **Login dialog box.**

5. In the Login dialog box, type your Username and Password, and click OK.

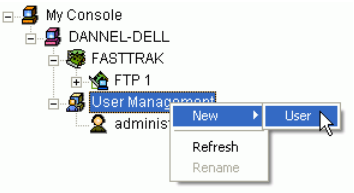
   Initially, administrator is the only user. Use the administrator's password selected during installation.

   If you want to log in to another user's RAID PC, obtain the User name and Password, if necessary

Create a New User

The administrator is created by default. You must create additional users manually.

1. Do one of the following:



   - Right click on the User Management icon and select New > User from the popup menu. A new User icon appears.
   - Or select the User Management icon and click the Add User button on the Toolbar.

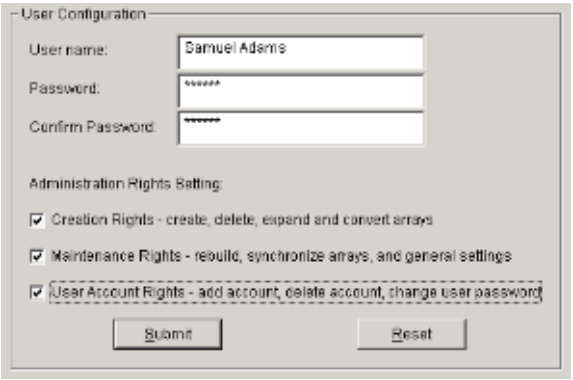


Figure 19. **User Configuration box.**

2. Right-click on the User icon to display the User Information View.

   The User Information View displays a request for new user identification and access rights.

Rights	Definition
Creation	Allows you to create and delete arrays, rebuild and synchronize arrays, and make general settings
Maintenance	Allows you to rebuild and synchronize arrays, and make general settings
User Account	Allows you to add and delete user accounts and change your password

Every User has at least one of these three Rights and can change his/her own password.

The Administrator can assign more or fewer rights to other Users but cannot change their passwords.

3. Type a User name and Password in their respective fields.

   Check all the appropriate boxes to set access rights. Click the Commit button when you are done.

   The new user's name appears on Tree View.

Create an Array

The available RAID selection depends on the number of disk drives available.

The table below lists the RAID Levels available with FastTrak TX Series and the number of drives required.

See *Appendix A: RAID Concepts* for a more detailed description.

RAID Level	Name	Minimum drives	Maximum drives
0	Striping	1	4
1	Mirroring	2	2
0+1	Striping + Mirroring	4	4

Table 2. **RAID Levels available on FastTrak TX Series.**

1. In Tree View, click the + to the left of the Controller icon to see the Disk View icon. Look under the Disk View icon to see the unassigned disk drives. Unassigned drives have this icon.
2. Right-click on the Array View icon and select New Array from the popup menu. A Create Array icon appears.
3. The Select the Create Array icon and go to the Create Array Settings in Information View.

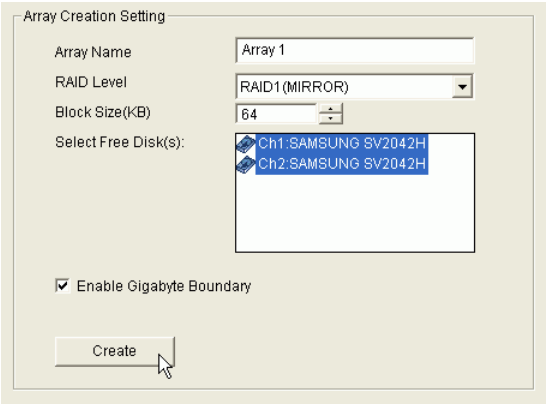


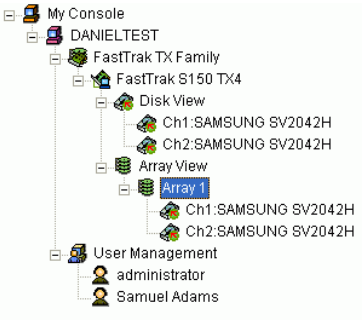
Figure 20. **Array Creation Setting box.**

4. In the Array Creation Settings box:
   - Type in a name for your array
   - Select the RAID Mode (Level) from the dropdown menu
   - Set the Stripe Block Size (see below)
   - Highlight the disk drives to add to the array
   - Check to enable Gigabyte Boundary, as desired (see below)

   Stripe Block Size – For RAID 0 and RAID 1+0 arrays, you can manually select the stripe block size. The size selected affects how FastTrak send and receives data blocks to and from the drives. In general, a larger block size is better when handling large data transfers (such as A/V editing and graphics) while a smaller size is better when handling email and other common server data. The default is 64KB. When in doubt, use the default value.

   Gigabyte Boundary – For RAID 1 and RAID 1+0 arrays. It rounds the size of the array down to the nearest whole gigabyte. It allows you to install a slightly smaller (within 1 GB) replacement drive, should the need arise. To enable Gigabyte Boundary, check the box.

5. Click the Create button when you are done.



   The new array appears in Tree View.

6. Restart your computer.

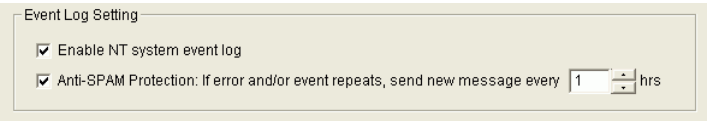
The next step is to partition and format the new array using the RAID PC's Operating System. See *Appendix B: Partition and Format* for more information.

Setup Alert Notification

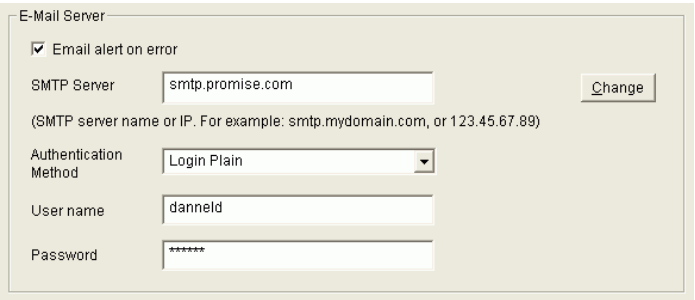
PAM alerts you to the problems and processes happening to your RAID through email and popup messages.

These steps describe how to setup the email function.

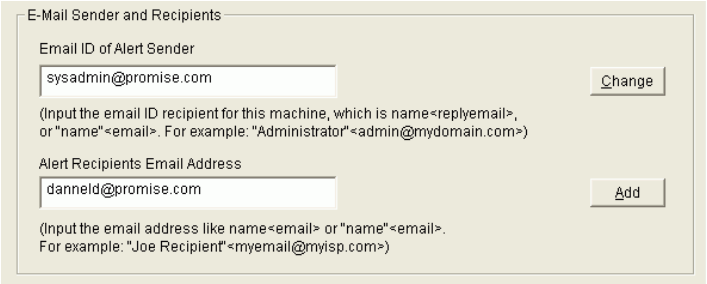
1. Click on the RAID Machine icon. Information for the RAID PC appears in Information View.



2. Be sure the Enable NT system event log checkbox is checked.
3. To reduce the volume of repeated messages, check the Anti-SPAM checkbox and set an acceptable time interval in hours.



4. Click on the Email alert on error box, if it is not already checked.
5. In the SMTP server field, type in the SMTP address for your mail server.
6. The default is No Authentication Method. If you want an Authentication Method, in the dropdown menu choose from:
   - CRAM-MD5
   - Authorized Login
   - Plain Login
7. Type in a User Name and Password in the fields provided.
8. Click the Change button to update your configuration.

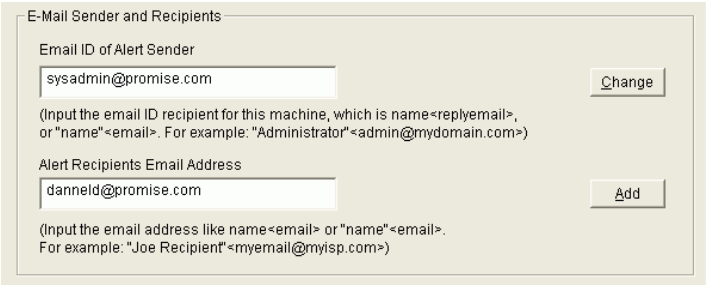


9. Scroll down to the Email Sender and Recipients box.
10. In the Email ID of Alert Sender field, type in the email address of this computer.
11. This address will appear in the From field of the email alerts. Recipients may reply to this address, if it is valid.
12. Click the Change button to update your configuration.

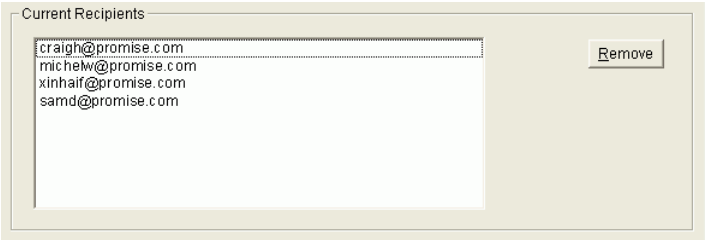
Add User to Recipient List

After you have setup email alert notification, you must specify who shall receive the alerts.

1. Click on the RAID Machine icon to which you wish to add an email alert message recipient.



2. In the Alert Recipients Email Address field, type in the email address of the user who you wish to receive alerts.
3. Click the Add button when you are done. The names appear in the Current Recipients window.

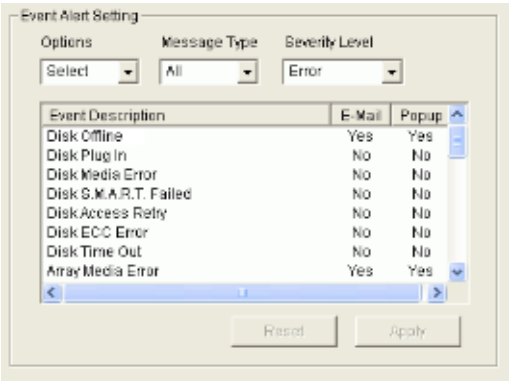


4. Repeat Step 2 until all addresses have been added.

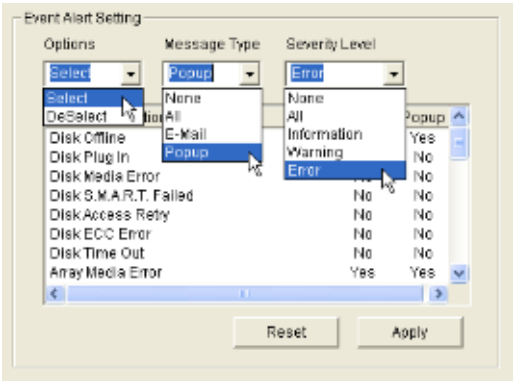
Specify Alert Notification Events

PAM can be configured to report a variety of alerts, by email, popup message or both. This section describes how to tell PAM what to report and which method to use.

1. Click on the RAID System icon whose alert notification events you wish to modify. The Event Alert Setting box appears in Information View.



2. The Event Alert Setting box has dropdown menus to help you select Alert Events quickly. To select Events, click on Options and choose Select.



3. Click on Message Type and choose message delivery by E-Mail, by popup, by All (both) or None.
4. Click on Severity Level and choose Error, Warning, Information, All or None.

Following is a list of Events and their Severity:

Information Events	Warning Events	Error Events
Disk Plug In	Disk Time Out	Disk Offline
Disk Access Retry	Disk S.M.A.R.T. Failed	Array Media Error
Controller Create Array	Disk ECC Error	Array Offline
Array Rebuild Started	Disk Time Out	Array Rebuild Failed
Array Auto Rebuild Started	Array Critical	Array Synchronization Failed
Array Rebuild Resumed	Controller Delete Array	Array Synchronization Comparison Error
Array Rebuild Completed	Array Rebuild Aborted	
Array Synchronization Started	Array Rebuild Paused	
Array Synchronization Aborted	Enclosure Over Temperature	
Array Synchronization Paused	Enclosure Fan Stop	
Array Synchronization Resumed	Enclosure 12V Error	
Array Synchronization Completed	Enclosure 5V Error	
Enclosure Power Up	Enclosure 3.3V Error	
Enclosure Power Down		

5. To select an individual Event, click in the E-Mail and Popup columns to toggle between Yes and No.
6. When you are finished, click the Apply button.

Chapter 4: PAM User Interface

This chapter describes PAM's Graphic User Interface (GUI). You should understand that PAM is software running on top of the Promise RAID BIOS and other applications that came with your Promise RAID product. PAM adds a graphic user interface to make RAID management functions easier to understand and perform.

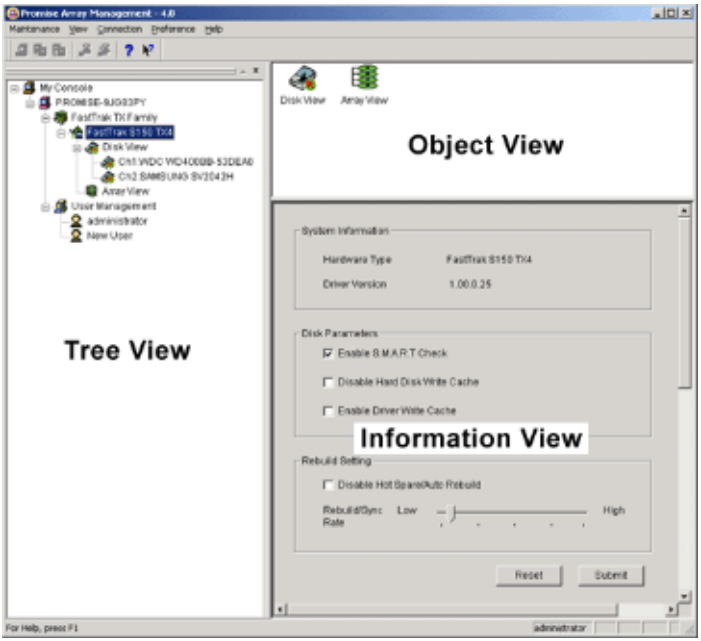


Figure 21. **The PAM Monitor window has three views.**

Tree View

Local PAM

The Tree View displays all of the elements of your RAID system. Use it to navigate to specific components.

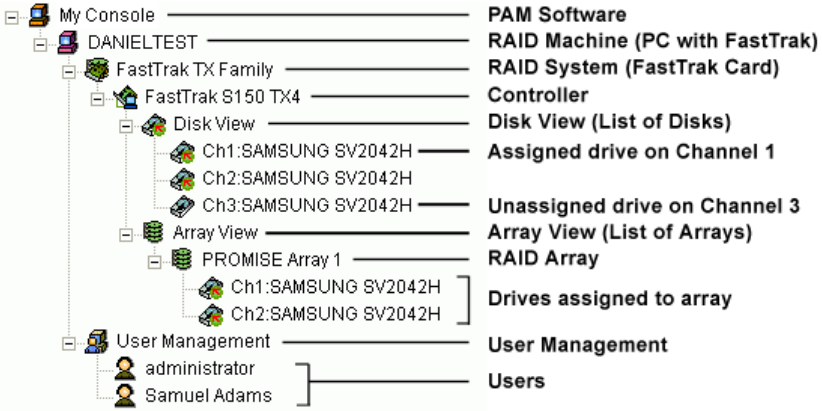


Figure 22. **An example of a Local PAM RAID system in Tree View.**

Remote PAM

Remote PAM adds a RAID Server icon to connect with the Message Server PC in order to monitor arrays over a network.

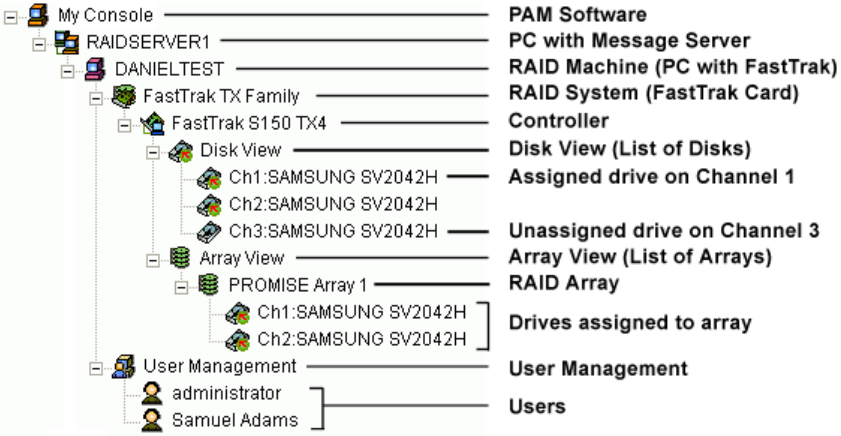


Figure 23. **An example of a Remote PAM RAID system in Tree View.**

Normally, the Tree View is present. To close it, right-click on any object and select Hide Pane from the popup menu.

To open it again, go to View menu and select Outline.

Tree View and Component Specific Menus

In PAM, like most Windows applications, you can access the various commands and functions by opening dropdown menus and clicking on icons. Each time you click on a component in Tree View, PAM's menu bar also displays that component's dropdown menu. Below are some examples.

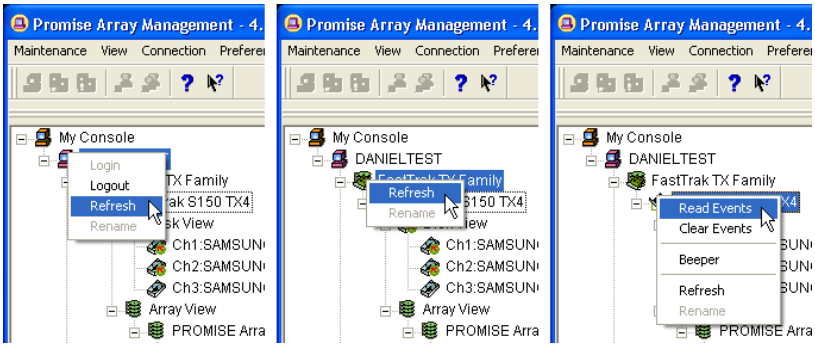


Figure 24. **Each item in Tree View has its own dropdown menu in the menu bar.**

Rather than access the menu bar, you can right click on the icon of the component you are working with. The menu bar and popup menus for Tree View items are identical.

Object View

Object View is visible whenever the Tree View is visible. The items appearing in Object View are determined by which component you select in Tree View. In the example below, we selected a Controller icon in Tree View.

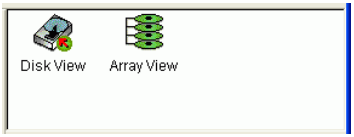


Figure 25. **Object View of a Controller's components.**

As a result, you see the components of that Controller, in this case, six channels, an enclosure and an array. This feature makes it easy to find an individual component as well as see what items are assigned to higher level components. Double-click on these items to see their components in Object View and their configuration in Information View.

Information View

Information View, like Object View, changes its content depending on which item you select in Tree View. The difference is that you use Information View to obtain data, input settings and information.

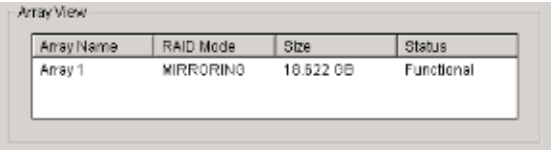


Figure 26. **Information View showing part of the setup for an Array.**

Status Bar

The PAM Status Bar is the same as other Windows applications. It indicates such things as the selected RAID is rebuilding, and the current user is the Administrator (shown below).

Figure 27. **PAM Status Bar.**

Normally the Status Bar is visible. To show or hide the Status Bar, go to the View menu and check or uncheck Status Bar.

Pulldown Menus

The left-most Pulldown Menu changes according to which component is selected in the Tree View.

This menu can be the Main, My Console, Server, RAID Machine, RAID System or Maintenance.

The functions of each menu are described below.

Main Menu

When no item in Tree View is selected, the left-most menu item is Main. Its only function is Exit, which quits the PAM application.

My Console Menu

When the My Console icon is selected, the My Console menu appears. Its functions include:

- Create a new Server
- Screen refresh
- Rename the My Console icon
- Exit PAM

Server Menu

The Server menu appears when the RAID Server icon is selected.

This menu applies only to Remote PAM. Its functions include:

- Modify the connection
- Delete the connection
- Connect
- Disconnect
- Screen refresh
- Rename the Server icon
- Exit PAM

RAID Machine Menu

When the RAID Machine is selected, the RAID Machine menu appears. Its functions include:

- Login
- Logout
- Screen refresh
- Exit PAM

RAID System Menu

The RAID System menu appears with the RAID System icon is selected. Its functions include:

- Screen refresh
- Exit PAM

Maintenance Menu

When the Controller icon is selected, the Maintenance menu displays Controller functions:

- Read Events in the Event Viewer
- Clear Events from the Event Viewer
- Toggle the Beeper on and off
- Refresh the screen
- Exit PAM

When the Array View icon is selected, the Maintenance menu displays Controller functions:

- Create an array
- Refresh the screen
- Rename the Array icon

View Menu

The View menu is always the same. It displays or hides three items:

- Toolbar
- Status Bar
- Tree View (Outline)

Check to display or uncheck to hide each one as you prefer.

Connection Menu

The Connection menu is always the same. It deals with server connections. Use it to:

- Create a new Message Server
- Connect to a RAID Server
- Disconnect from a RAID server

Preference Menu

The Preference menu is always the same. It allows you to start PAM automatically when your PC boots.

Check to enable or uncheck to disable this feature.

If you are using PAM for remote monitoring, running PAM automatically is a good idea.

This way, your PC will be connected to the RAID and you will receive all the alerts messages you have specified.

Help Menu

The Help menu is always the same. Under Help, PAM has:

- Full online Help file
- Auto Demo display
- About page with PAM information

Toolbar

The Toolbar is a series of buttons that are shortcuts to performing specific tasks. You will never see all buttons active as in the example below.

Figure 28. **The Toolbar.**

They become active when you click on specific system components in Tree View. Only the tool buttons pertaining to that component are active.

Most of these functions require User Account Rights. These are specified when a User is added or modified. Following is a description of the Toolbar buttons:

New Server. Available when you select the MyConsole icon in Remote PAM. Creates a new Message Server.

Connect. Available when you select the Message Server icon in Remote PAM. Initiates a connection with the RAID Server.

Disconnect. Available when you select a Message Server icon. Disconnects from the RAID Server. Used when you want to shut down a RAID server for repair.

Delete User. Available when you select a User icon. Deletes the user from monitoring and alert access.

New User. Available when you select the User Management icon.

About. Brings up the information about this version of PAM.

Help. Always available. Brings up the Online Help.

Popup Menus

In addition to the commands in the dropdown menus, there is a corresponding set of commands you can access via popup menus.

In a popup menu, you can use any of the commands that are in black.

You will notice that some functions are grayed out, meaning that you cannot use them.

Many functions require that you have User Account Rights to perform them.

MyConsole Icon

Right-click on the MyConsole icon to access the following commands:

- New Server (Remote PAM)
- Screen refresh
- Rename the My Console icon

Message Server Icon

Right-click on the Message Server icon to access the following commands:

- Modify the connection
- Delete the connection
- Connect
- Disconnect
- Screen refresh
- Rename the Message Server icon

RAID Machine Icon

Right-click on the RAID Machine icon to access the following commands:

- Login
- Logout
- Screen refresh

RAID System Icon

The RAID System icon represents the FastTrak TX Family of RAID Controller cards (right).

There are two commands for this item:

- Screen refresh

Controller Icon

Right-click on the Controller icon to access the following commands:

- Read Events in the Event Viewer
- Clear Events from the Event Viewer
- Toggle the Beeper on and off
- Refresh the screen

Disk View Icon

The Disk View icon represents an individual channel on the FastTrak Controller card.

There are two commands for this item.

- Refresh the screen

Disk Icon

Right-click on the Disk icon of an unassigned drive or the Disk icon of an assigned drive to access the following commands:

- Refresh the screen

Array View Icon

Right-click on the Array View icon to see all of the arrays on this controller.

- Create an array
- Refresh the screen

Array Icon

Right-click on the Array icon to access the following commands:

- Synchronize this array
- Delete this array
- Pause synchronization/rebuild
- Continue synchronization/rebuild
- Refresh the screen
- Rename the Array

User Management Icon

Right-click on the User Management icon to access the following commands:

- Create a New User
- Refresh the screen

User Icon

Right-click the User icon to access the following commands:

- Delete this User
- Refresh the screen

Chapter 5: RAID Monitoring and Maintenance with PAM

This chapter describes using PAM to monitor and manage your RAID system. The chapter is divided into sections for as follows:

- Remote PAM
- Local PAM
- User Management
- Alert Notification
- Controller
- Arrays

Remote PAM

Create a RAID Server

Remote PAM works over your network. Therefore it requires additional steps the first time you log on. Launch Remote PAM. When the PAM user interface appears:

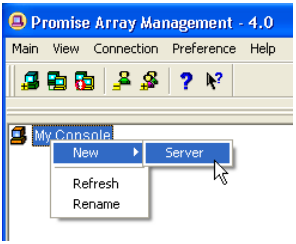


Figure 29. **Make a new RAID Server.**

1. Right-click on the My Console icon and:
   - Select New > Server from the popup menu.
   - Click the New Server icon in the Toolbar.

   A RAID Server icon appears.

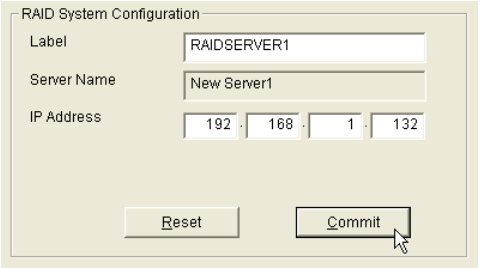


Figure 30. **RAID System Configuration box.**

2. Click on the RAID Server icon. In Information View, type in the IP address of the computer where the Message Server Software is installed.

   If the Message Server software in installed on the monitoring PC (the PC you are now working on), you can use the default 127.0.0.1 IP address.

3. Click Commit. A list of networked RAID PCs appears as shown below.

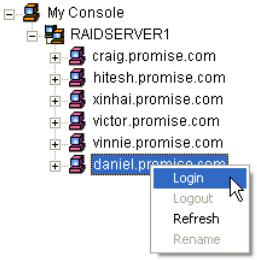


Figure 31. **List of networked RAID PCs.**

Log-in to RAID PC

1. Right-click on a RAID Machine icon in Tree View. Select Login from the popup menu. The Login dialog box appears.

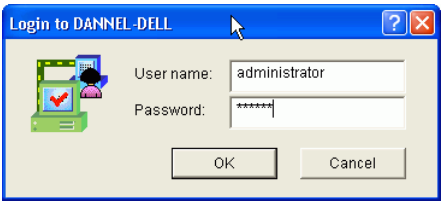


Figure 32. **Login dialog box.**

2. In the Login dialog box, type your Username and Password, and click OK.

   Initially, administrator is the only user. Use the administrator's password selected during installation.

3. If you want to log in to another user's RAID PC, obtain the User name and Password, if necessary.

Log-out of RAID PC

You can log out of one RAID PC while remaining connected to others on the network.

Right-click on the RAID Machine icon of the PC you want to disconnect and select Logout from the popup menu.

Disconnect from RAID Server

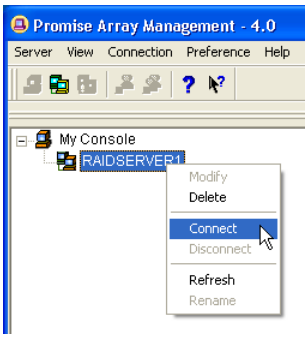
Logout of the RAID Server effectively logs you out of all RAID PCs using that network connection.

To disconnect from the network:

- Right-click on a RAID Server icon and select Disconnect from the popup menu.
- Or right-click on the RAID Server icon and click the Disconnect icon in the Toolbar.

Future Connections to RAID Server

The RAID Server remains under the MyConsole icon until deleted. It continues to work as long as the IP address is correct.



To make a connection with an existing RAID Server:

- Right-click on a RAID Server icon and select Connect from the popup menu.
- Or right-click on the RAID Server icon and click the Connect icon in the Toolbar.

The Login list of networked RAID PCs appears as before.

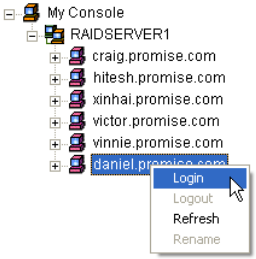
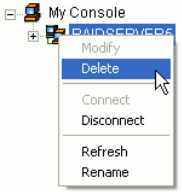


Figure 33. **List of networked RAID PCs.**

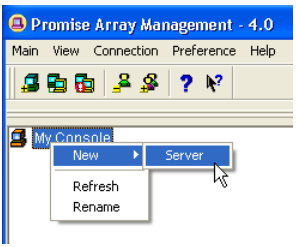
Log into a RAID PC as described above.

Message Server IP Address Change

If the IP address changes for the computer where the Message Server software is installed, an existing RAID Server with the old address will no longer work.



1. Right-click on a RAID Server icon and select Delete from the popup menu.
2. Click OK in the confirmation dialog box.



3. Right-click on the My Console icon and:
   - Select New > Server from the popup menu.
   - Click the New Server icon in the Toolbar.

   A RAID Server icon appears.

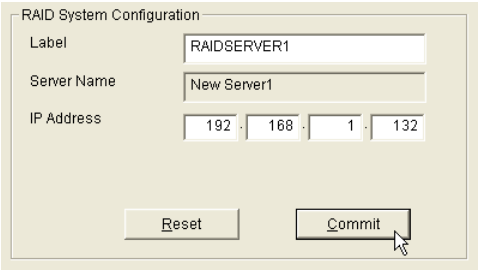


Figure 34. **RAID System Configuration box.**

4. Click on the RAID Server icon. In Information View, type in the IP address of the computer where the Message Server Software is installed.

   If the Message Server software in installed on the monitoring PC (the PC you are now working on), you can use the default 127.0.0.1 IP address.

5. Click Commit. A list of networked RAID PCs appears as shown below.

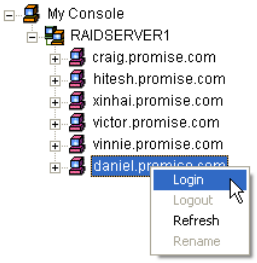


Figure 35. **List of networked RAID PCs.**

Local PAM

Log-in

Launch Local PAM. When the PAM user interface appears:

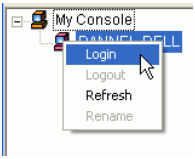


Figure 36. **Log in to Local PAM.**

1. Right click on the RAID Machine icon in Tree View. Select Login from the popup menu. The Login dialog box appears.

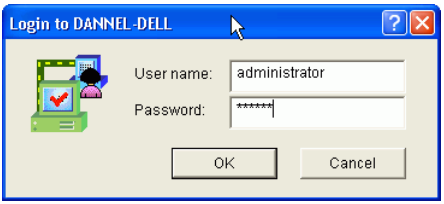


Figure 37. **Login dialog box.**

2. In the Login dialog box, type your Username and Password, and click OK.

   Initially, administrator is the only user. Use the administrator's password selected during installation.

Log-out

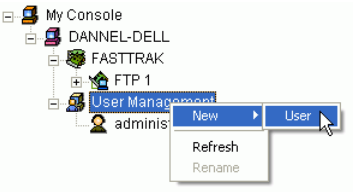
To log-out of a Local PAM, right-click on the RAID Machine icon and select Logout from the popup menu.

User Management

Create a User

The administrator is created by default. You must create additional users manually.

1. Do one of the following:



- Right click on the User Management icon and select New > User from the popup menu. A new User icon appears.
- Or select the User Management icon and click the Add User button on the Toolbar.

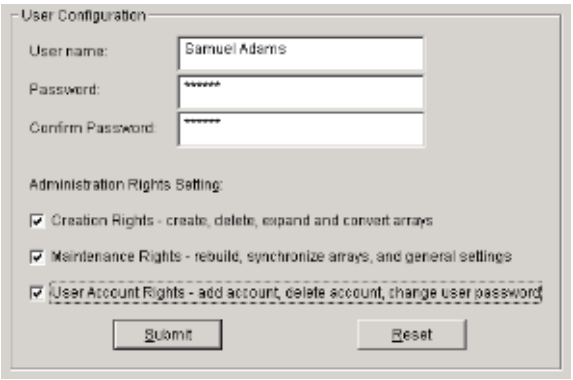


Figure 38. **User Configuration box.**

2. Right-click on the User icon to display the User Information View.

   The User Information View displays a request for new user identification and access rights.

Rights	Definition
Creation	Allows you to create and delete arrays, rebuild and synchronize arrays, and make general settings
Maintenance	Allows you to rebuild and synchronize arrays, and make general settings
User Account	Allows you to add and delete user accounts and change your password

Every User has at least one of these three Rights and can change his/her own password.

The Administrator can assign more or fewer rights to other Users but cannot change their passwords.

3. Type a User name and Password in their respective fields.

   Check all the appropriate boxes to set access rights. Click the Submit button when you are done.

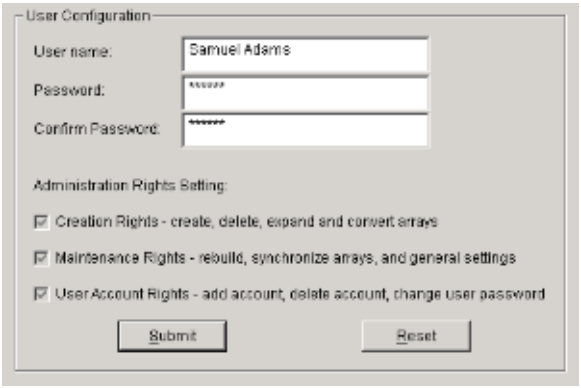
   The new user's name appears on Tree View.

Change Password

Every User can change his/her own password.

The Administrator cannot change other Users' passwords.

1. Log-in to PAM under the User Name whose Password you want to change.
2. Click on the icon of the User whose Password you want to change.

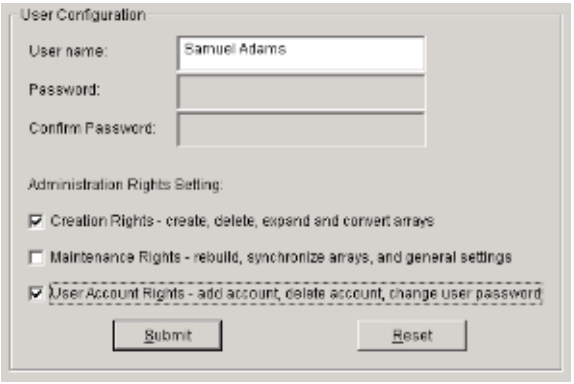


3. In Information View, type in a new Password in the two Password fields.
4. Click the Submit button when you are done.

Change User Rights

The Administrator can change any User's Rights. Other Users cannot change their Rights.

1. Log into PAM as the Administrator.
2. Click on the icon of the User whose Rights you want to change.



3. In Information View, check or uncheck Rights options as desired (above).
4. Click the Submit button when you are done.

Delete a User

1. In the Tree View, right-click on the icon of the User you wish to delete and select Delete from the popup menu.
2. In the confirmation dialog box, click OK.

Note: PAM will always keep one user account with access rights, typically the Administrator. This action protects you from being locked out of the system.

Another way to delete a User: Select the User's icon in Tree View then click the Delete User button in the Toolbar.

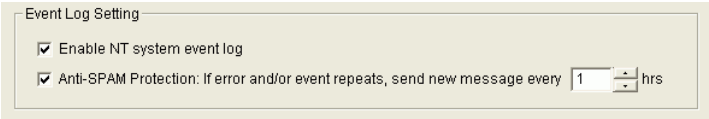
Alert Notification

Setup Alert Notification

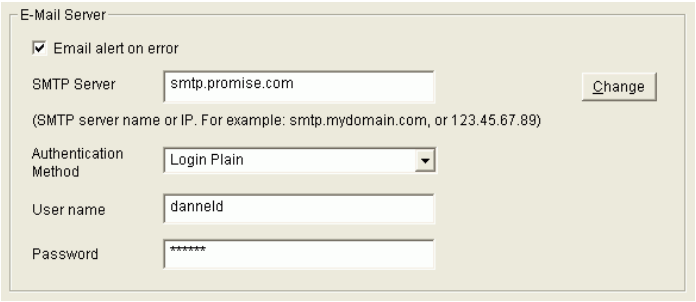
PAM alerts you to the problems and processes happening to your RAID through email and popup messages.

These steps describe how to setup the email function.

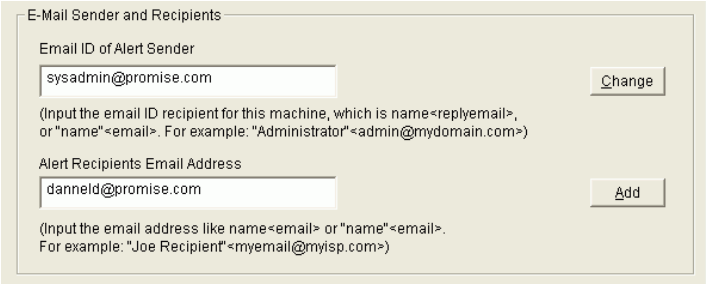
1. Click on the RAID Machine icon. Information for the RAID PC appears in Information View.



2. Be sure the Enable NT system event log checkbox is checked.
3. To reduce the volume of repeated messages, check the Anti-SPAM checkbox and set an acceptable time interval in hours.



4. Click on the Email alert on error box, if it is not already checked.
5. In the SMTP server field, type in the SMTP address for your mail server.
6. The default is No Authentication Method. If you want an Authentication Method, in the dropdown menu choose from:
   - CRAM-MD5
   - Authorized Login
   - Plain Login
7. Type in a User Name and Password in the fields provided.
8. Click the Change button to update your configuration.

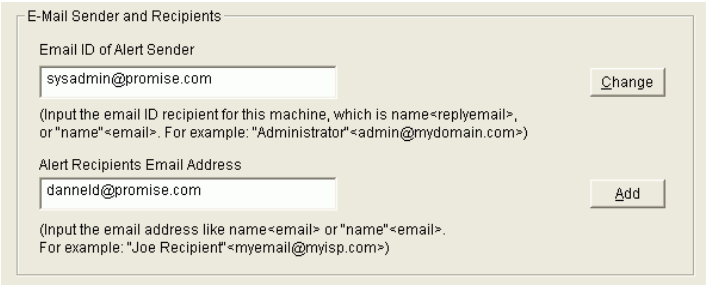


9. Scroll down to the Email Sender and Recipients box.
10. In the Email ID of Alert Sender field, type in the email address of this computer.
11. This address will appear in the From field of the email alerts. Recipients may reply to this address, if it is valid.
12. Click the Change button to update your configuration.

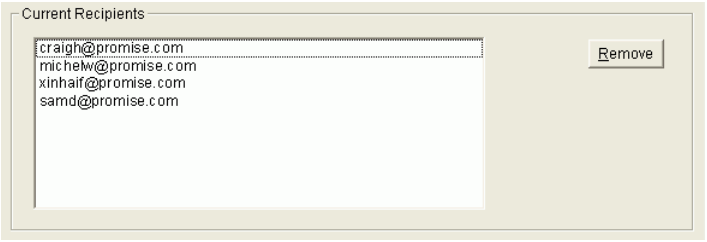
Add User to Recipient List

After you have setup email alert notification, you must specify who shall receive the alerts.

1. Click on the RAID Machine icon to which you wish to add an email alert message recipient.



2. In the Alert Recipients Email Address field, type in the email address of the user who you wish to receive alerts.
3. Click the Add button when you are done. The names appear in the Current Recipients window.



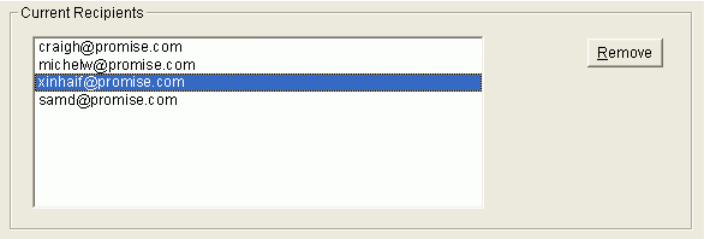
4. Repeat Step 2 until all addresses have been added.

Delete User from Recipient List

To remove a recipient from the Email Address List, do the following:

1. Click on the RAID Machine icon from which you wish to delete an email alert message recipient.

   The Current Recipients window appears in the Information View.

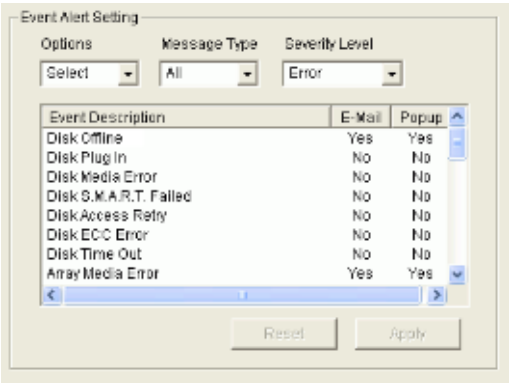


2. Select the recipient you wish to delete
3. Click the Remove button or press the Delete key to remove the address from the list.

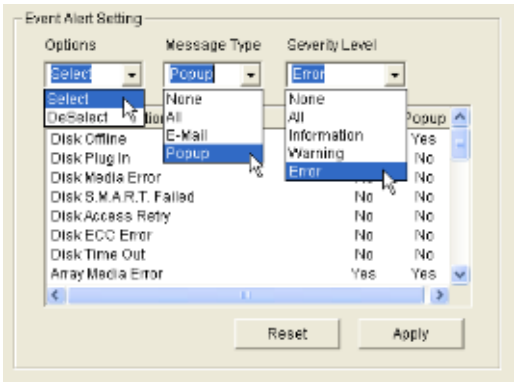
Specify Alert Notification Events

PAM can be configured to report a variety of alerts, by email, popup message or both. This section describes how to tell PAM what to report and which method to use.

1. Click on the RAID System icon whose alert notification events you wish to modify. The Event Alert Setting box appears in Information View.



2. The Event Alert Setting box has dropdown menus to help you select Alert Events quickly. To select Events, click on Options and choose Select.



3. Click on Message Type and choose message delivery by E-Mail, by popup, by All (both) or None.
4. Click on Severity Level and choose Error, Warning, Information, All or None.

Following is a list of Events and their Severity:

Information Events	Warning Events
Disk Plug In	Disk Time Out
Disk Access Retry	Disk S.M.A.R.T. Failed
Controller Create Array	Disk ECC Error
Array Rebuild Started	Disk Time Out
Array Auto Rebuild Started	Array Critical
Array Rebuild Resumed	Controller Delete Array
Array Rebuild Completed	Array Rebuild Aborted
Array Synchronization Started	Array Rebuild Paused
Array Synchronization Aborted	Enclosure Over Temperature
Array Synchronization Paused	Enclosure Fan Stop
Array Synchronization Resumed	Enclosure 12V Error
Array Synchronization Completed	Enclosure 5V Error
Enclosure Power Up	Enclosure 3.3V Error
Enclosure Power Down	

Error Events
Disk Offline
Array Media Error
Array Offline
Array Rebuild Failed
Array Synchronization Failed
Array Synchronization Comparison Error

5. To select an individual Event, click in the E-Mail and Popup columns to toggle between Yes and No.
6. When you are finished, click the Apply button.

Controller

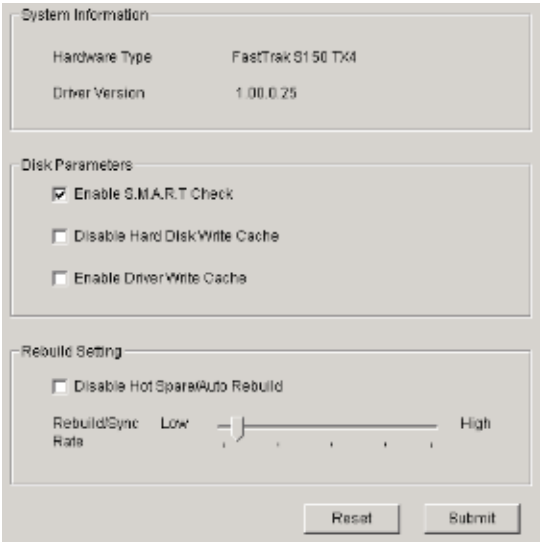
Options

The Controller has system information and settings several important features.

Click on the Controller icon in Tree View to see the Options in Information View.

To return to the previous settings, click Reset.

To Apply the changes you have made, click Submit.



System Information

This describes the Controller type, in this case a FastTrak S150 TX4, and the FastTrak driver version. This information may be helpful when upgrading your FastTrak or troubleshooting the PC.

Disk Parameters

Check the respective boxes to enable these features:

SMART Check – SMART, an acronym for Self-Monitoring Analysis and Reporting Technology, is a feature of the disk drive software. It monitors the internal performance of the drive and reports to the PC when it finds a potential failure. SMART warns you of a developing drive failure so you can replace the drive before it actually fails.

Disable Hard Disk Write Cache – Disables the Write Cache on the hard disk drives. This action will reduce performance unless you enable the Driver (FastTrak) Write Cache.

Enable Driver Write Cache – Speeds hard disk performance by writing data to the cache on the FastTrak Controller card. When you are done setting controller options, click on the Array icon choose between Write Back and Write Though cache settings (see below).

Rebuild Setting

Check the respective boxes to enable these features:

Disable Hot Spare/Auto Rebuild – Disables automatic rebuilding using a hot spare drive or a newly installed replacement drive. With this option checked, you must initiate rebuilding manually. See RAID 1 (Mirroring) and Hot Spare Drive.

Rebuild/Sync Rate – Allocates system resources between rebuilding the array and responding to read/write commands from the computer system.

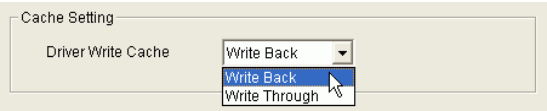
A **High** setting assigns most of the system resources to a rebuild or synchronization of the array. The process will finished sooner but read/write requests are handled slower.

A **Low** setting assigns most of the system resources to handling read/write requests. Read/write requests are handled at nearly normal speed while the rebuild or synchronization takes longer.

See Rebuild an Array for more information on the rebuilding process.

Array Cache Settings

Click on the Array icon look in the Information View to see the Array Cache Setting.



Enable Driver Write Cache must be checked in Disk Parameters (see above) in order for this option to work.

Click on the dropdown menu to select the Cache Setting.

Write Through – Data is written to the cache and hard drive at the same time. This arrangement is safer.

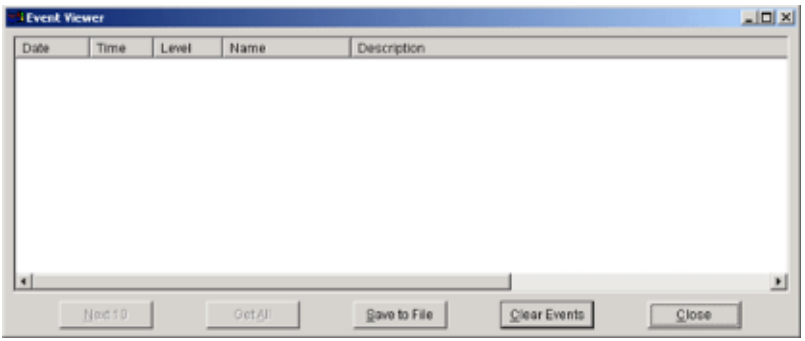
Write Back – Data is written to the cache first and to the hard drive later. This arrangement increases performance at the risk of data loss if the power fails.

View Event Log

The Controller's Memory Buffer records all the events that happen on the RAID, classified as Errors, Warnings and Information.

These are very useful for diagnosing and solving problems on your system.

To see the Event Log, right-click on the Controller icon in Tree View and select Read Events from the popup menu.



In the Event Viewer, you can view the events, make a permanent record by saving them to a file, and clear the events from the Viewer.

You can also clear the events using the popup menu in Tree View.

Note that the collecting and reporting of these Events is independent from the Alert Notification preferences set for the RAID System.

Arrays

Create an Array

The available RAID selection depends on the number of disk drives available.

The table below lists the RAID Levels available with FastTrak TX Series and the number of drives required.

See *Appendix A: RAID Concepts* for a more detailed description.

RAID Level	Name	Minimum drives	Maximum drives
0	Striping	1	4
1	Mirroring	2	2
0+1	Striping + Mirroring	4	4

Table 3. **RAID Levels available on FastTrak TX Series.**

1. In Tree View, click the + to the left of the Controller icon to see the Disk View icon. Look under the Disk View icon to see the unassigned disk drives. Unassigned drives have this icon.
2. Right-click on the Array View icon and select New Array from the popup menu. A Create Array icon appears.
3. The Select the Create Array icon and go to the Create Array Settings in Information View.

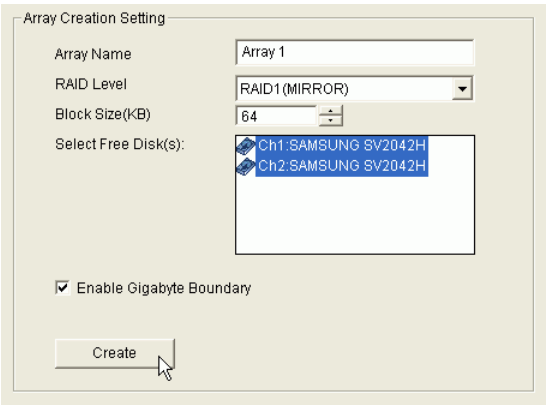


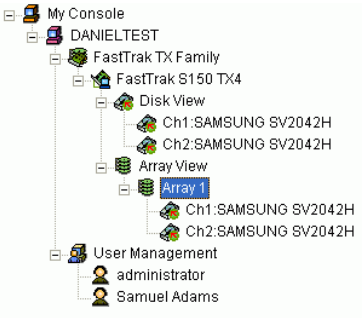
Figure 39. **Array Creation Setting box.**

4. In the Array Creation Settings box:
   - Type in a name for your array
   - Select the RAID Mode (Level) from the dropdown menu
   - Set the Stripe Block Size (see below)
   - Highlight the disk drives to add to the array
   - Check to enable Gigabyte Boundary, as desired (see below)

   Stripe Block Size – For RAID 0 and RAID 1+0 arrays, you can manually select the stripe block size. The size selected affects how FastTrak send and receives data blocks to and from the drives. In general, a larger block size is better when handling large data transfers (such as A/V editing and graphics) while a smaller size is better when handling email and other common server data. The default is 64KB. When in doubt, use the default value.

   Gigabyte Boundary – For RAID 1 and RAID 1+0 arrays. It rounds the size of the array down to the nearest whole gigabyte. It allows you to install a slightly smaller (within 1 GB) replacement drive, should the need arise. To enable Gigabyte Boundary, check the box.

5. Click the Create button when you are done.



   The new array appears in Tree View.

The next step is to partition and format the new array using the RAID PC's Operating System.

Hot Spare Drive

Using a Hot Spare Drive is an option for RAID 1 (Mirroring) arrays.

In order to function, a Hot Spare Drive has two requirements:

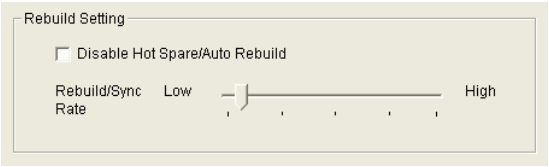
- Attach a third disk drive to the FastTrak Controller card without assigning it to an array
- Do not Disable Hot Spare/Auto Rebuild in the Controller Options

Install a Third Drive

If necessary, see the *FastTrak TX Series User Manual* for instructions how to install disk drives with FastTrak.

Controller Settings

1. Click on the Controller icon in Tree View to see the Rebuild Setting in Information View.



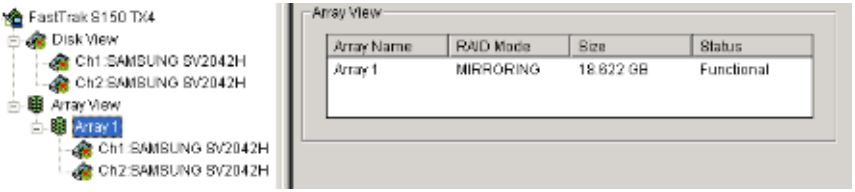
2. Be sure the checkbox is NOT checked:

   Disable Hot Spare/Auto Rebuild – Disables automatic an automatic rebuild using a spare drive not assigned to the array.

   The Rebuild/Sync Rate is irrelevant to the Hot Spare Drive feature.

3. Click Submit.

Array Functional



When your array is first created, it will display *Functional* status.

If you have enabled Scheduled Synchronization, you will occasionally notice that your array is *Synchronizing*. Then it returns again to Functional.

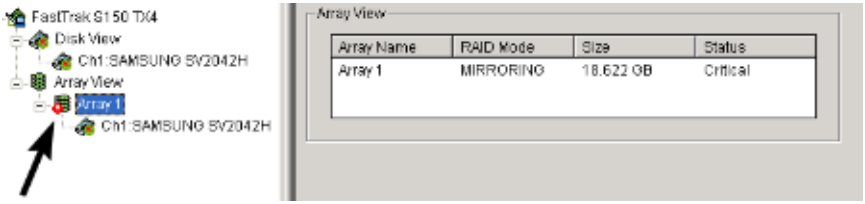
If your array encounters a problem with a disk drive, it will display *Critical* status. This indicates that your array requires your attention in order to return to Functional.

When a disk drive fails on a non-fault-tolerant (RAID 0) array, the result is an *Offline* status.

Array Critical

When a disk drive fails on a fault-tolerant array (RAID 1 and 0+1) for any reason, the Array goes Critical. The array can still read and write data but fault tolerance has been lost.

An Array Critical icon displays in Tree View and the alarm (if enabled) beeps quickly to call your attention to the condition.



Your first action is to identify which disk drive has failed.

1. Click on the Controller icon to expand it.
2. Click on the Array icon to expand it.
3. Observe and compare the disk drives currently displayed with those originally assigned to the Array.

In the example above, there are two disk drives attached to the FastTrak controller and both are assigned to a RAID 1 array.

The disk drive on Channel 2 does not appear. This is the failed drive.

- If you have a Hot Spare drive installed and enabled, the array will begin to Rebuild automatically.
- If you do not have a Hot Spare drive, you must replace the failed drive before a Rebuild of the array can begin.

Refer to the *FastTrak TX Series User Manual* for more information about replacing a failed drive.

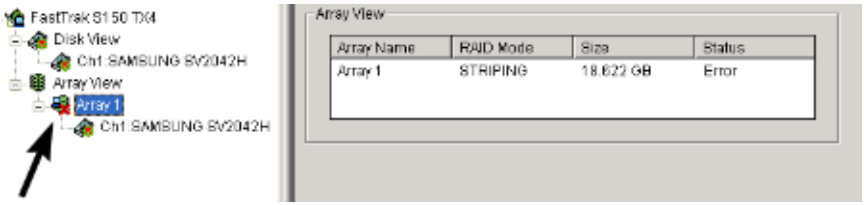
After you replace the failed drive, go on to *Rebuild an Array*, later in this Chapter.

Array Offline

When a disk drive fails on a non-fault-tolerant array (RAID 0) for any reason, the Array goes Offline. The array cannot read or write data. All of the data on the array will be lost unless the failed drive is restored to operation.

A fault-tolerant array (RAID 1 or 0+1) will go Offline if two disk drives fail.

An Array Offline icon displays in Tree View and the alarm (if enabled) beeps quickly to call your attention to the condition.



Your first action is to identify which disk drive has failed.

1. Click on the Disk View icon to expand it.
2. Click on the Array View icon to expand it.
3. Look for the drive that was part of this Array but is now missing. Observe and compare the disk drives under the Controller with those under the Array.

   In the example above, two disk drives attached to the FastTrak controller were assigned to a RAID 0 array.

   The disk drive on Channel 1 is present, but the second drive is not. The second is the failed drive.

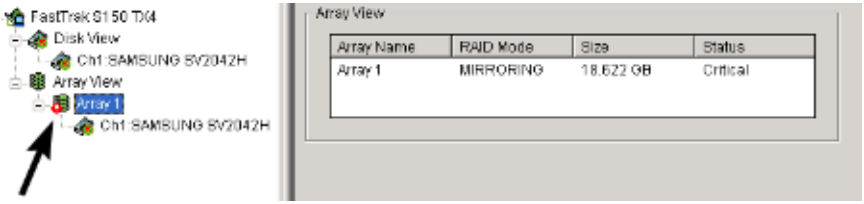
4. When you have identified the failed drive, check its connections and run the drive manufacturer's diagnostic program in an effort to restore the drive to operation.

There is no Rebuild function for a non-fault-tolerant array.

Rebuild an Array

To Rebuild is to restore redundancy to a RAID 1 or 0+1 after one of its drives has failed. Unlike Synchronization, a Rebuild is a repair operation.

When a drive fails for any reason, the Array goes Critical. An Array Critical icon displays in Tree View and the RAID alarm beeps quickly to call your attention to the condition.



Automatic Rebuild

Normally, the rebuild process begins automatically when you replace the faulty disk drive.

The Array recognizes the new or spare drive and begins the process a few moments later.

If your array has a Hot Spare drive, the rebuild begins without waiting for a replacement drive.

Be sure to replace the faulty drive as soon as possible.

During the Rebuild process, the array is still available to read and write data but it may run noticeably slower.

To enable a Hot Spare drive, change the Rebuild settings and shut off the beeper, see *Rebuild Settings*, below.

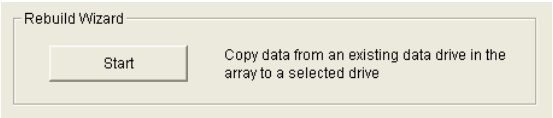
If the popup messages are enabled, one will notify you when the rebuild is successfully completed. The array will return to Functional status.

Manual Rebuild

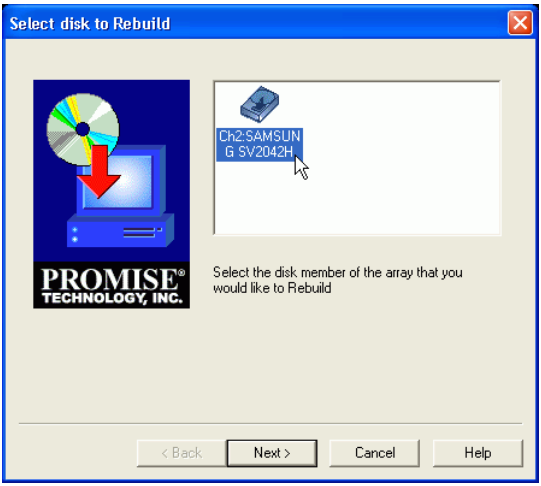
After you replace a failed disk drive, the replacement drive must be rebuilt in order to restore the Array.

To initiate an array Rebuild manually:

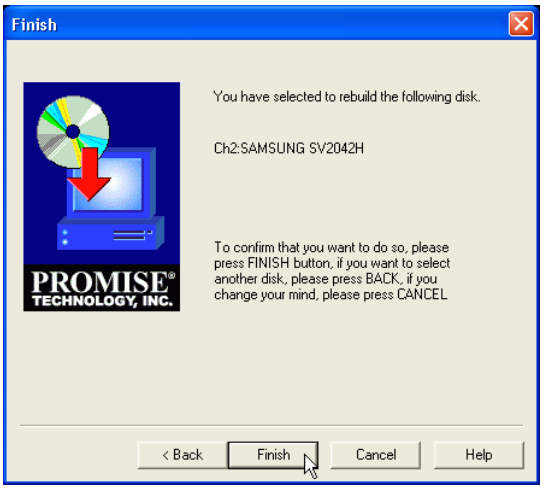
1. In Tree View, select the Array icon of the array you want to rebuild.



2. In Information View, click on the Start button inside the Rebuild Wizard box.

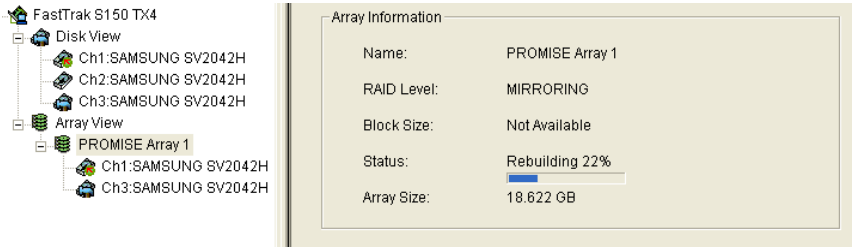


3. In the Rebuild Wizard, select the drive to be rebuilt (the replacement drive) and click Next.



To confirm the rebuild choice, click Finish.

Tree View and Information View display the progress (below).



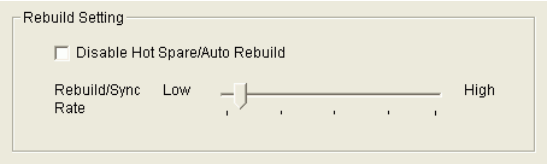
During the Rebuild process, the array will be available for use but it may run noticeably slower.

If the beeper is enabled, it will beep slowly during this process.

If the popup messages are enabled, one will notify you when the Rebuild is successfully completed. The array will return to Functional status.

Rebuild Settings

Beeper – Right-click on the Controller icon and select Beeper from the popup menu. A checkmark means the beeper is enabled.



Disable Hot Spare/Auto Rebuild – Disables automatic rebuilding using a hot spare drive or a newly installed replacement drive. With this option checked, you must initiate rebuilding manually. See RAID 1 (Mirroring) and Hot Spare Drive.

Rebuild/Sync Rate – Allocates system resources between rebuilding the array and responding to read/write commands from the computer system.

A **High** setting assigns most of the system resources to a rebuild or synchronization of the array. The process will finished sooner but read/write requests are handled slower.

A **Low** setting assigns most of the system resources to handling read/write requests. Read/write requests are handled at nearly normal speed while the rebuild or synchronization takes longer.

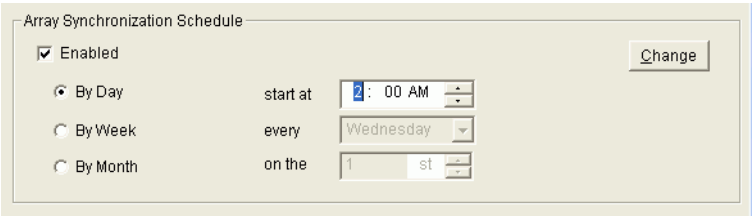
Synchronize an Array

Promise uses the term *synchronization* to mean an automated process of checking and correcting data and parity. Unlike a Rebuild, Synchronization is a maintenance operation.

Synchronization applies to RAIDs 1 and 0+1. It takes place when an array is first created and then, optionally, on a regularly scheduled basis to maintain content integrity.

Scheduled Synchronization

Schedule a time for synchronization when the RAID is least busy reading and writing data. The early morning hours are often a convenient time.



To enable scheduled synchronization:

1. In Tree View, select the RAID Machine icon. In Information View, scroll down to the bottom.
2. Check the Enabled box.
3. Click on the radio button beside the time interval (by day, week or month) you want.
4. Based on the time interval you selected, enter the clock time, day of the week or day of the month for the synchronization process to begin.
5. When you are done, click the Change button.

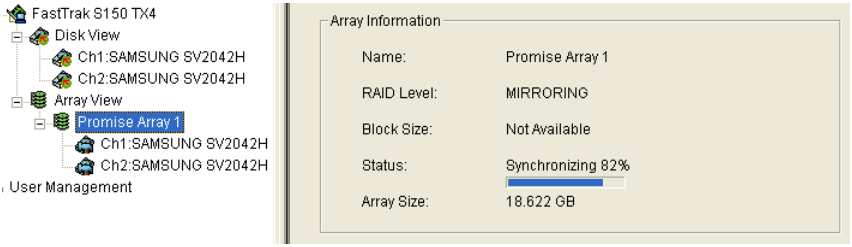
   The Synchronization Schedule is set. If the Schedule is disabled, it will remember its current settings.

On Demand Synchronization

In addition to schedule Synchronization, you can direct FastTrak to begin the Synchronization process immediately. To access this feature:

1. Right-click on the Array icon and select Synchronize from the popup menu.
2. Click OK to the confirmation message.

   Information View displays the progress (below).



During the Synchronization, the array will be available for use but it may run noticeably slower.

If the popup messages are enabled, one will notify you when the Synchronization is successfully completed. The array will return to Functional status.

Stop, Pause, Continue

Promise recommends that you let your rebuild run to completion. If you need to pause the process:

1. Right-click on the icon of the Array that is rebuilding and select Pause from the popup menu.
2. To continue, right-click on the same icon again and select Continue from the popup menu.

Delete an Array

To delete an array:

1. Right-click on the icon of the Array you want to delete.
2. Select Delete from the popup menu.
3. Click OK in the confirmation dialog box.

Appendix A: RAID Concepts

RAID

RAID is an acronym that stands for Redundant Array of Independent Disks. It is divided into different numbered Levels. The numbers of these Levels do not mean that one Level is higher or better than another. Each Level has its own advantages and shortcomings.

PAM allows you to select the RAID Level when you create an Array. The available RAID Level selection depends on which Promise product you have and the number of disk drives available.

The table below lists the RAID Levels obtainable with FastTrak TX Series.

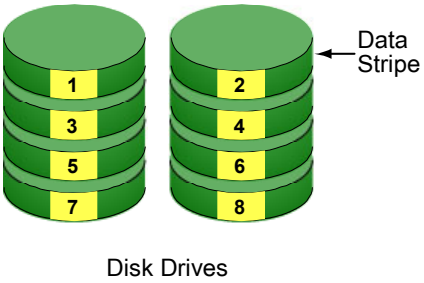
RAID Level	Name	Minimum drives	Maximum drives
0	Striping	1	4
1	Mirroring	2	2
0+1	Striping + Mirroring	4	4

Table 4. **RAID Levels for the FastTrak TX series.**

Following is a discussion how these RAID Levels work.

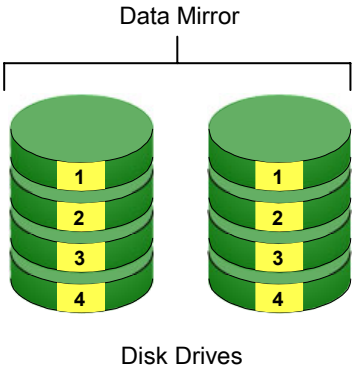
RAID 0

RAID 0 is a method of striping, or writing data over two or more hard disks at the same time. Multiple disks can read and write data faster than one. However, there is no data redundancy with this arrangement, so if one disk fails, all your data is lost.

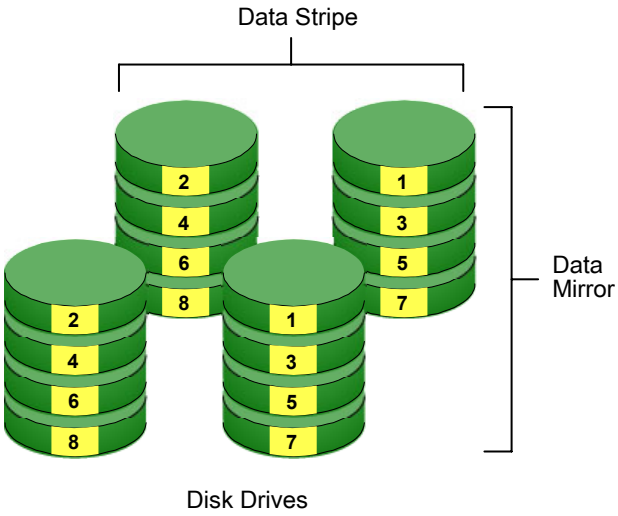


RAID 1

RAID 1 takes the data written on one disk and copies it to another, making a mirror or exact copy. This arrangement does not have a significant performance advantage. If one disk fails, there is no data loss. There is no rebuild, just a copy of the data to the disk.



RAID 0+1



RAID 0+1 is a combination the high data rates of RAID 0 and full redundancy of RAID 1. A disadvantage is that you must have at least 4 hard disks to implement it. If one disk fails, there is no data loss. There is no rebuild, just a copy of the data to the disk.

Appendix B: Partition and Format

In order for your Windows to recognize and work with your array, you must partition and format the array. These actions create a file structure within your array with which Windows can work.

Note

If you plan to boot your computer from this array, go to Windows and Device Driver Installation under the Installation section for instructions. The instructions here are for data arrays only.

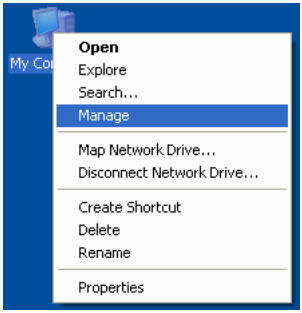


Figure 40. **Right-click on the My Computer icon.**

1. From the desktop, right-click on the My Computer icon and select Manage from the popup menu. The Computer Management window opens.
2. From the left menu, click on Disk Management. The Disk Management window opens with your new array identified as Disk 1. The Initialize Wizard appears automatically.

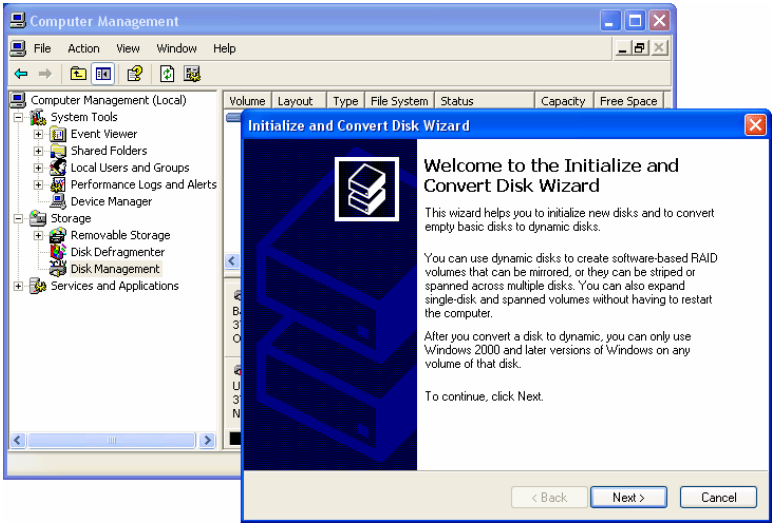


Figure 41. **The Disk Management Window and Disk Wizard.**

3. Click the Next button to start the Wizard.
4. In the following windows, select Disk 1 to Initialize. Do not select any disks to Convert. Click the Finish button to Initialize the array.

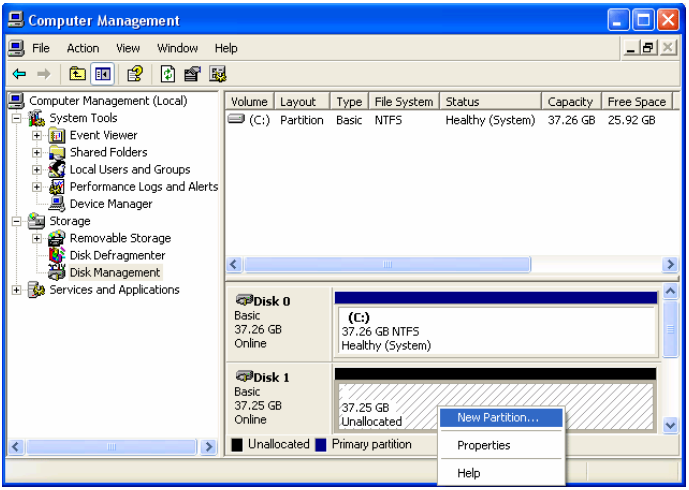


Figure 42. **Initialized array ready for partition and format.**

5. Right-click on the Unallocated portion of Disk 1 and select New Partition... from the popup menu. The New Partition Wizard appears.

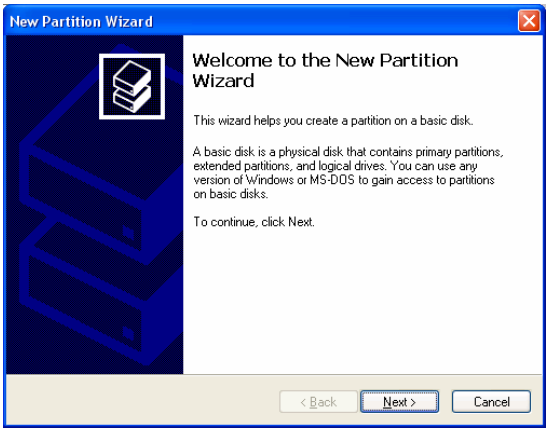


Figure 43. **The New Partition Wizard.**

6. Click the Next button to start the wizard.
7. In the following windows, do the following actions. Click Next to move to the next window.
   - Select Primary Partition
   - Specify the maximum available partition size in MB
   - Assign the available drive letter of your choice
   - Choose Format this partition with the following settings
   - File system: NTFS
   - Allocation unit size: Default
   - Volume label: Enter your choice of name
   - Do not check “Perform a quick format” or “Enable file and folder compression”
8. Review your selections and click Finish. The New Partition Wizard will disappear while partitioning and formatting begin.

   This process will take some time. The Disk Management window displays the progress.

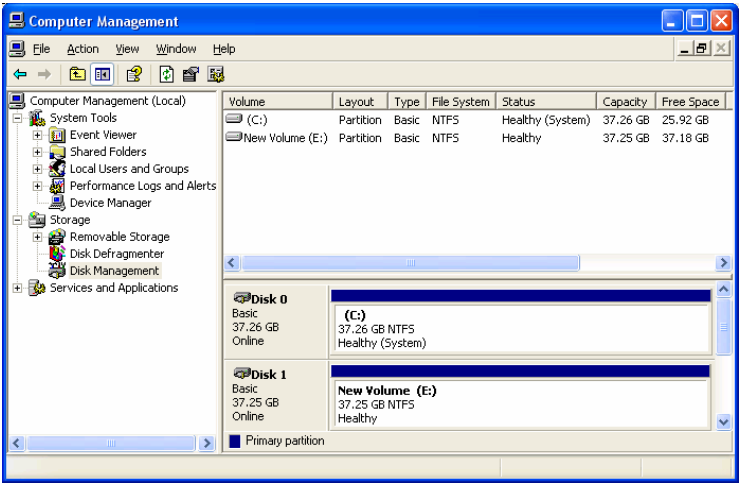


Figure 44. **The newly formatted array as it appears under Disk Management.**

When formatting is complete, your array will appear as a hard drive in the Disk Management window (above) and the My Computer window (below).

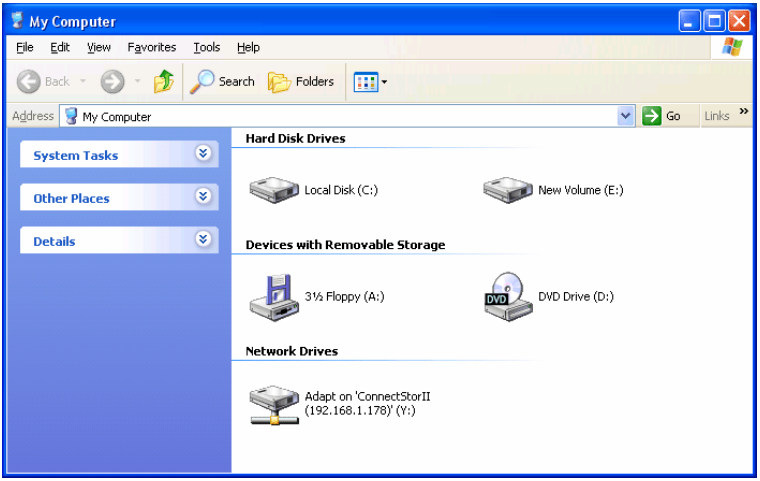


Figure 45. **The newly formatted array under My Computer.**

Appendix C: Networking Issues

IP Address

In order for PAM to be configured over a network, you must know the IP (network) address of every component. The Message Server uses IP addresses to communicate with the Message Agent on the RAID PCs and the Monitoring Utility on the network PCs.

To find the IP network address:

1. Go to Start > Programs > Accessories > Command Prompt.
2. Type **ipconfig/all** and press Enter.

   The Windows IP Configuration displays (below).

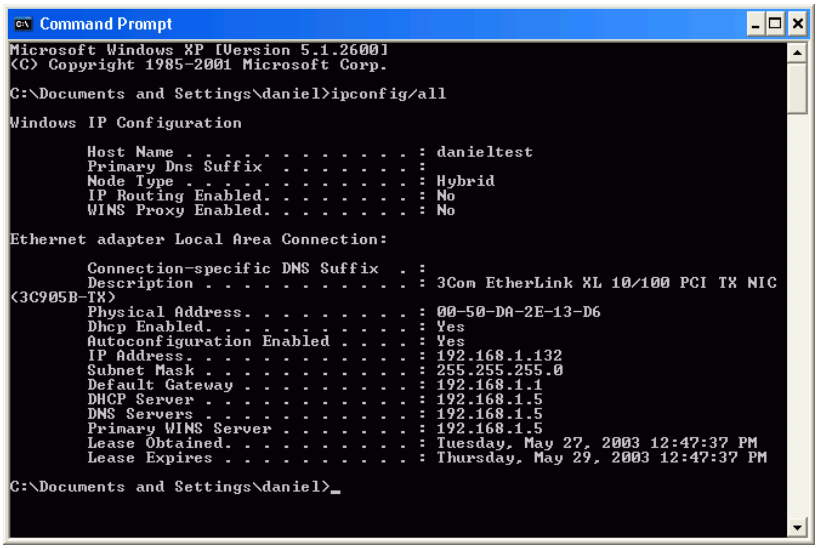


Figure 46. **Use the Command Prompt to find your PC's IP address.**

In the example above, the IP address of this PC is 192.168.1.132.

Locate and record the IP addresses of all PCs and Servers on your network that will work with PAM. This document will help you recall individual PCs when it is time to specify their connections.

DHCP Issues

Referring to the Figure 84 above, note that it says:

```
Dhcp enabled. . . . . . . . : Yes
```

This means that a DHCP server gave this IP address to this PC when the PC connected to the network. DHCP stands for Dynamic Host Configuration Protocol and refers to software that allows a file server to assign IP addresses to computers on the network.

DHCP is very helpful in reducing the number of IP address a company or organization requires. The DHCP server assigns an IP address to a computer as it logs onto the network. The IP address will remain the same until the computer logs off or disconnects for any reason, such as a power failure. When the computer logs on again, it will receive a different IP address.

Because IP addresses are subject to change when a DHCP server is involved, make it a point to maintain the RAID PC network connections at all times. When a disconnection happens for any reason, you must find the new IP address and enter it into the Message Server. Instructions for doing this appear under *Message Server IP Address Change* in Chapter 5.

To avoid having to make Message Server IP Address changes, assign the RAID PC a permanent IP address. See your IT Manager for guidance.

Appendix D: Technical Support

Promise Technical Support provides several support options for Promise users to access information and updates. We encourage you to use one of our electronic services, which provide product information updates for the most efficient service and support.

If you decide to contact us, please have the following information available:

- Product model and serial number
- BIOS and driver version numbers
- A description of the problem / situation
- System configuration information, including: motherboard and CPU type, hard drive model(s), ATA/ATAPI drives & devices, and other controllers.

Technical Support Services

Promise Online™ Web Site	http://www.promise.com (technical documents, drivers, utilities, etc.)

USA Tech Support Center

E-mail Support	support@promise.com
Fax Technical Support	(408) 228-6401 Attention: Technical Support
Phone Technical Support	(408) 228-6402 7:30-5:30pm M-F Pacific Standard Time
If you wish to write us for support:	Promise Technology, Inc. Attn: Technical Support 1745 McCandless Drive Milpitas, CA 95035, USA

European Tech Support

E-mail Support	support@promise.nl
Fax Technical Support	+31 (0) 40 256 9463 Attention: Technical Support
Phone Technical Support	+31 (0) 40 235 2600 8:30-5:00pm The Netherlands Time
If you wish to write us for support:	Promise Technology Europe B.V. Attn: Technical Support Luchthavenweg 81-125 5657 EA Eindhoven, The Netherlands

Pacific Rim Sales Office

E-mail Support	support@promise.com.tw
Fax Technical Support	+886 3 578 23 90 Attention: Technical Support
Phone Technical Support	+886 3 578 23 95 (ext. 8870) 9:00-6:00pm Taiwan Time
If you wish to write us for support:	Promise Technology, Inc. Attn: Technical Support 2F, No. 30, Industry E. Rd. IX Science-based Industrial Park Hsinchu, Taiwan, R.O.C.

China Office

E-mail Support	support-china@promise.com
Fax Technical Support	+86 10 6872 3940 Attention: Technical Support
Phone Technical Support	+86 10 6872 3941 9:00-6:00pm China Time
If you wish to write us for support:	Promise Technology China Attn: Technical Support Room 3213, No. 11 South Zhong Guan Cun Street Hai Dian District, Beijing 100081 P.R. China